

In the Specification:

Please amend the paragraph beginning on page 1, line 5 as follows:

Technical Field of the Invention

Please amend the paragraph beginning on page 1, line 6 as follows:

~~The present invention relates to a~~ A method of fabricating semiconductor devices, and more particularly, to an oxynitride film is disclosed.

Please amend the paragraph beginning on page 2, line 7 as follows:

In particular, in case of NMOS, if the oxynitride film is used as the tunnel oxide film, the threshold voltage is dropped over 100mV compared with the pure silicon oxide film even where the concentration of nitrogen at the Si-SiO₂ interface is about 1 atom% atomic%. ~~This~~ Thus, it is difficult to secure the desired transistor characteristic. FIG. 1 is a graph illustrating the difference in the threshold voltage at the transistor using the pure silicon oxide film and the oxynitride film as the dielectric film. In FIG. 1, 'a' indicates a case where the pure silicon oxide film is used as the dielectric film, and 'b' and 'c' indicate cases where the oxynitride film is used as the dielectric film. From FIG. 1, it could be seen that if the oxynitride film is used as the tunnel oxide film, the threshold voltage is dropped about 110mV compared with the pure silicon oxide film when the concentration of nitrogen at the Si-SiO₂ interface is dropped about 1.437~~atom%~~ atomic%.

Please amend the paragraph beginning on page 2, line 21 as follows:

SUMMARY OF THE INVENTION DISCLOSURE

Please amend (delete) the paragraph beginning on page 2, line 22 as follows:

~~Accordingly, the present invention is contrived to substantially obviate one or more problems due to limitations and disadvantages of the related art.~~

Please amend the paragraph beginning on page 2, line 24 as follows:

~~An object of the present invention is to provide a~~ A method of forming an oxynitride film is disclosed which is capable of securing the characteristics of a film that are significantly improved than the characteristics of a film obtained in a pure

silicon oxide film and minimizing variation in the threshold voltage of a transistor by a trap charge.

Please amend (delete) the paragraph beginning on page 3, line 5 as follows:

~~Additional advantages, objects, and features of the invention will be set forth in part in the description which follows and in part will become apparent to those having ordinary skill in the art upon examination of the following or may be learned from practice of the invention. The objectives and other advantages of the invention may be realized and attained by the structure particularly pointed out in the written description and claims hereof as well as the appended drawings.~~

Please amend the paragraph beginning on page 3, line 12 as follows:

~~To achieve these objects and other advantages and in accordance with the purpose of the invention, as embodied and broadly described herein, a~~ A disclosed ~~method of fabricating an oxynitride film according to the present invention is characterized in that it comprises: the steps of loading a silicon substrate into an oxidization furnace, implanting injecting an oxygen based source gas into the oxidization furnace to grow a pure silicon oxide film on the silicon substrate, blocking implantation stopping the injection of the oxygen based source gas and implanting injecting an inert gas to exhaust or purge the oxygen based source gas remaining within the oxidization furnace, raising a the temperature within the oxidization furnace to a nitrification process temperature, stabilizing the temperature within the oxidization furnace, implementing a nitrification process for the pure silicon oxide film by implanting injecting a nitrogen based source gas, and stopping implantation the injection of the nitrogen based source gas and heating the oxidation furnace to a higher temperature before~~ rapidly cooling the oxidization furnace while ~~implanting injecting~~ the inert gas into the oxidization furnace.

Please amend the paragraph beginning on page 4, line 2 as follows:

~~In another aspect of the present invention, it~~ It is to be understood that both the foregoing general description and the following detailed description ~~of the present invention~~ are exemplary and explanatory and are intended to provide further explanation of the ~~invention as claimed~~ claims.

Please amend the paragraph beginning on page 4, line 8 as follows:

The above and other ~~objects~~, features and advantages of the ~~present invention~~ disclosed method will be apparent from the following detailed description of the preferred embodiments ~~of the invention~~ in conjunction with the accompanying drawings, in which:

Please amend the paragraph beginning on page 5, line 1 as follows:

Reference will now be made in detail to the preferred embodiments of the ~~present invention~~ disclosed methods, examples of which are illustrated in the accompanying drawings.

Please amend the paragraph beginning on page 5, line 10 as follows:

Referring now to FIG. 2 ~ through FIG. 5, the reason why the density of the trap charge is increased as the concentration of nitrogen at the Si-SiO₂ interface is increased is that an interfacial trap charge is generated due to stress occurring while Si-N bonding in lieu of Si-O bonding is formed at the Si-SiO₂ interface by nitrogen penetrated into a pure silicon oxide film in a nitrification process. Accordingly, in order to minimize the trap charge of the Si-SiO₂ interface, a method capable of reducing by stress occurring while nitrogen is coupled with silicon and oxygen at the Si-SiO₂ interface must be sought. In order to solve the above problem, the ~~present invention~~ disclosed method employs a method of relaxing stress by controlling an annealing process condition during the nitrification process or implementing a subsequent annealing process after the nitrification process.

Please amend the paragraph beginning on page 7, line 4 as follows:

After the nitrification process is completed, in a state that the source gas is blocked and only a pure inert gas is injected into the oxidization furnace, the oxidization furnace is cooled as fast as it is possible. The fast cooling speed rate at this time is good if it is fast as soon as possible, ~~which~~ does not cause a physical bent or warping phenomenon in the wafer. As the cooling speed of the oxidization furnace is fast, it is effective to prevent reproducibility of the trap charge. At this time, after the pure silicon oxide film is grown in the oxidization furnace if necessary for process constitution, the nitrification process may be implemented in additional equipment in the above procedure.

Please amend the paragraph beginning on page 7, line 16 as follows:

Turning to FIG. 4 and FIG. 5, in a method of removing the trap charge already occurred in the nitrification process through subsequent annealing, if the annealing process is implemented by ~~implanting~~ injecting the inert gas (for instance, Ar, N₂, etc.) at a temperature of over a nitrification process temperature, the Si-SiO₂ interface having a unstable lattice structure due to nitrogen substitution is reconstructed to have a stable lattice structure, so that the trap charges that were already generated are extinguished.

Please amend the paragraph beginning on page 7, line 24 as follows:

A pure silicon oxide film of a desired thickness is first grown within the oxidization furnace. At this time, the pure silicon oxide film may be formed by implementing a wet oxidization process at a temperature of about 750~800°C. After the oxidization process, a source gas is blocked and an inert gas is injected into the oxidization furnace to exhaust all the remaining oxide materials. In succession, in a state that growth of an unwanted oxide film is prevented under the inert gas atmosphere, the temperature is stabilized for performing a nitrification process. At this time, the nitrification process temperature has no limitation to the lowest temperature unlike the first embodiment and would be okay if it is sufficient to secure a desired nitrification process level. In general, it would be possible if the temperature is over 800°C. After the temperature for the nitrification process is stabilized, a nitrification process is implemented by ~~implanting~~ injecting the source gas into the oxidization furnace. At this time, the source gas used may include NH₃, N₂O, NO, or the like. Also, it is possible that the source gas is diluted with the inert gas such as argon (Ar) or N₂ in order to grow an oxide film having the concentration of nitrogen required for the Si-SiO₂ interface and a nitrogen-rich oxide film.

Please amend the paragraph beginning on page 8, line 18 as follows:

After the nitrification process is completed, the temperature is ~~raised up~~ increased to an annealing process temperature in a state that the source gas flow is ~~blocked shut off~~ and only a pure inert gas is ~~implanted~~ injected into the oxidization furnace to purge any remaining source gas. At this time, the temperature of the annealing process has no problem if it is performed at a temperature of over the nitrification process temperature. Although the effect of removing the trap charge is

~~outstanding as excellent when the annealing temperature is kept higher than the nitrification temperature high, and~~ the temperature is adequately controlled considering a thermal budget affecting the device. The annealing process is implemented under an inert atmosphere such as argon (Ar) or N₂. After the process is completed, the oxidization furnace is cooled ~~at a speed~~ as fast as possible. The cooling ~~speed rate~~ at this time is ~~good if it is~~ should preferably be as fast as soon as possible, which does not cause a physical bent or warping phenomenon in the wafer. As the cooling ~~speed rate~~ of the oxidization furnace is fast, it is effective to prevent reproducibility of the trap charge. At this time, after the pure silicon oxide film is grown in the oxidization furnace if necessary for process constitution, the nitrification process may be implemented in additional equipment in the above procedure.

Please amend the paragraph beginning on page 9, line 11 as follows:

As described above, ~~according to the present invention,~~ the disclosed method of forming the oxynitride film ~~proposed by the present invention~~ can be applied to fabricate the tunnel oxide film of the flash memory device or a gate oxide film of other memories or logic devices. In this case, the ~~present invention~~ disclosed method can have new effects that it can secure the characteristics of a film that are significantly improved than those obtained in the conventional pure silicon oxide film, and minimize variation in the threshold voltage of the transistor by a trap charge that is a disadvantage in the existing oxynitride film.

Please amend the paragraph beginning on page 9, line 19 as follows:

The forgoing embodiments are merely exemplary and are not to be construed as limiting ~~the present invention of this disclosure~~. The present teachings can be readily applied to other types of apparatuses. The description of the ~~present invention~~ disclosed methods is intended to be illustrative, and not to limit the scope of the claims. Many alternatives, modifications, and variations will be apparent to those skilled in the art.